CLAIMS

1. A wireless communication network comprising:

a set of n nodes, where at least one of the n nodes comprises:

an antenna element for transmitting and receiving a wireless signal;

a detector element configured to determine a minimum transmittance power required to covey data to a cluster of nodes, the cluster comprising N nodes of the set of n nodes, wherein $2 \leq N < n-1$; and

a transmit power adjustment element, operatively interfaced with the detector element, the transmit power adjustment element configured to provide the minimum transmittance power to the antenna element.

2. The wireless communication network of claim 1, the network having a first node outside of the cluster and a second node within the cluster, wherein each node within the cluster of N nodes communicates directly with other nodes within the cluster, and the first node communicates with the second node via multiple hops.

3. The wireless communication network of claim 1, wherein at least one of the nodes is a power-adjustable node, the power-adjustable node further comprises a connectivity table for storing an ID and the minimum transmittance power associated with the power adjustable node within the cluster.

4. The wireless communication network of claim 1, wherein the detector element determines the minimum transmittance power by comparing an attenuation of a signal originating at a first node within the cluster with a known transmittance power of the first node.

5. The wireless communication network of claim 1, wherein the wireless communication network is an ad-hoc network of sensors.

6. The wireless communication network of claim 1, wherein the wireless communication network is an ad-hoc low-mobility network.

7. The wireless communication network of claim 1, wherein the detector element periodically updates the minimum transmittance power required to convey data to the N nodes.

8. The wireless communication network of claim 1, wherein the detector element dynamically determines an operating power level based on multi-hop data throughput data.

9. The wireless communication network of claim 1, wherein the minimum transmittance power is selected based on interference zones and multi-hop data throughput.

10. A wireless communication device for use in a wireless communication network comprising:

an antenna element for transmitting and receiving a wireless signal;

a detector element configured to determine a minimum transmittance power required to covey data to a cluster of nodes, the cluster comprising N nodes of a set of n nodes, wherein $2 \leq N < n-1$; and

a transmit power adjustment element, operatively interfaced with the detector element, the transmit power adjustment element configured to provide the minimum transmittance power to the antenna element.

11. The wireless communication device of claim 10, further comprising a connectivity table for storing an ID and the minimum transmittance power associated with at least one of the nodes within the cluster.

12. The wireless communication device of claim 10, wherein the detector element determines the minimum transmittance power by comparing an attenuation of a signal originating at a first node within the cluster with a known transmittance power of the first node.

13. The wireless communication device of claim 10, wherein the detector element periodically updates the minimum transmittance power required to convey data to the N nodes.

14. The wireless communication device of claim 10, wherein the detector element dynamically determines an operating power level based on multi-hop data throughput.

15. The wireless communication device of claim 10, wherein the minimum transmittance power is selected based on interference zones and multi-hop data throughput.

16. A wireless communication network comprising:

a set of n nodes, the set comprising a cluster of N nodes where $2 \leq N < n-1$, a first node outside the cluster, and a second node inside the cluster,

wherein at least one node in the cluster of N nodes communicates directly with the other N-1 nodes in its cluster, and the first node communicates with the second node via multiple hops; and

the at least one node comprising:

a detector element configured to determine a minimum transmittance power required to covey data to a node within the cluster of nodes; and

a transmit power adjustment element operatively interfaced with the detector element, the transmit power adjustment element configured to provide the minimum transmittance power to an antenna element.

17. The wireless communication network of claim 16, wherein the at least one node is a power-adjustable node in the cluster of N nodes, the power-adjustable node further comprises a connectivity table for storing an ID and the minimum transmittance power associated with the power-adjustable node.

18. The wireless communication network of claim 16, wherein the detector element determines the minimum transmittance power by comparing an attenuation of a signal originating at a third node within the cluster with a known transmittance power of the third node.

19. The wireless communication network of claim 16, wherein the wireless communication network is an ad-hoc network of sensors.

20. The wireless communication network of claim 16, wherein the wireless communication network is an ad-hoc low-mobility network.

21. The wireless communication network of claim 16, wherein the detector element periodically updates the minimum transmittance power required to convey data to the nodes within the cluster of N nodes.

22. The wireless communication network of claim 16, wherein the detector element dynamically determines an operating power level based on multi-hop data throughput.

23. The wireless communication network of claim 16, wherein the minimum transmittance power is selected based on interference zones and multi-hop data throughput.

24. A power-controlled wireless communication device for use in a network, the network having n nodes, said power-controlled wireless communication device comprising:

an antenna element for radiating and detecting signals, the antenna element configured to receive a signal from another wireless communication device;

a detector element configured to determine a received power level of the received signal from the other wireless communication device, the other wireless communication device transmitting at a known transmit power level, the other wireless communication device belonging to a cluster of nodes, the cluster having N nodes, where $2 \leq N < n-1$; and

a connectivity table for storing an ID of the other wireless communication device and an associated transmit power level associated with the other wireless communication device, the associated transmit power level being calculated from the known transmit power level and the received power level.

25. The wireless communication device of claim 24, wherein the detector element periodically updates the minimum transmittance power required to convey data to the nodes within the cluster of nodes.

26. The wireless communication device of claim 24, wherein the detector element dynamically determines an operating power level based on multi-hop data throughput.

27. The wireless communication device of claim 24, wherein the transmittance power is selected based on interference zones and end-to-end data throughput.

28. A method for improving multi-hop network data throughput in wireless ad hoc networks by optimizing transmitter output power, the wireless ad hoc network having n nodes, the method comprising acts of:

receiving a plurality of signals from different wireless nodes in the wireless ad hoc network wherein at least one received signal has a known transmittance power;

calculating a degree of signal attenuation for at least one node in the cluster; and

utilizing the determined degree of signal attenuation and the known transmittance powers to calculate a near optimal transmittance power, whereby a cluster of N neighbors is determined, wherein $2 \leq N < n-1$.

29. The method of claim 28 further comprising an act of periodically updating the near optimal transmittance power.

30. The method of claim 28 further comprising an act of dynamically updating the near optimal transmittance power.

31. The method of claim 28 wherein the near optimal transmittance power is calculated based on interference zones and multi-hop data throughput.

32. The method of claim 28 wherein the method is applied to a network of sensor nodes.

33. The method of claim 28 wherein the method is applied to a network of low-mobility nodes.

34. A method of optimizing power consumption in a network, the network having a first node and a second node, the method comprising steps of:

receiving a beacon signal from the first node at a known transmit power;

measuring a received power level of the beacon signal at the second node;

calculating a optimum transmit power from the second node to the first node based upon the known transmit power and the received power level of the beacon; and

utilizing the optimum transmit power when sending data from the second node to the first node.

35. The method of claim 34 further comprising an act of periodically updating the near optimal transmittance power.

36. The method of claim 34 further comprising an act of dynamically updating the near optimal transmittance power.

37. The method of claim 34 wherein the near optimal transmittance power is calculated so as to minimize interference zones and maximize multi-hop data throughput.

38. The method of claim 34 wherein the method is applied to a network of sensor nodes.

39. The method of claim 34 wherein the method is applied to a network of low-mobility nodes.